FIG. 1

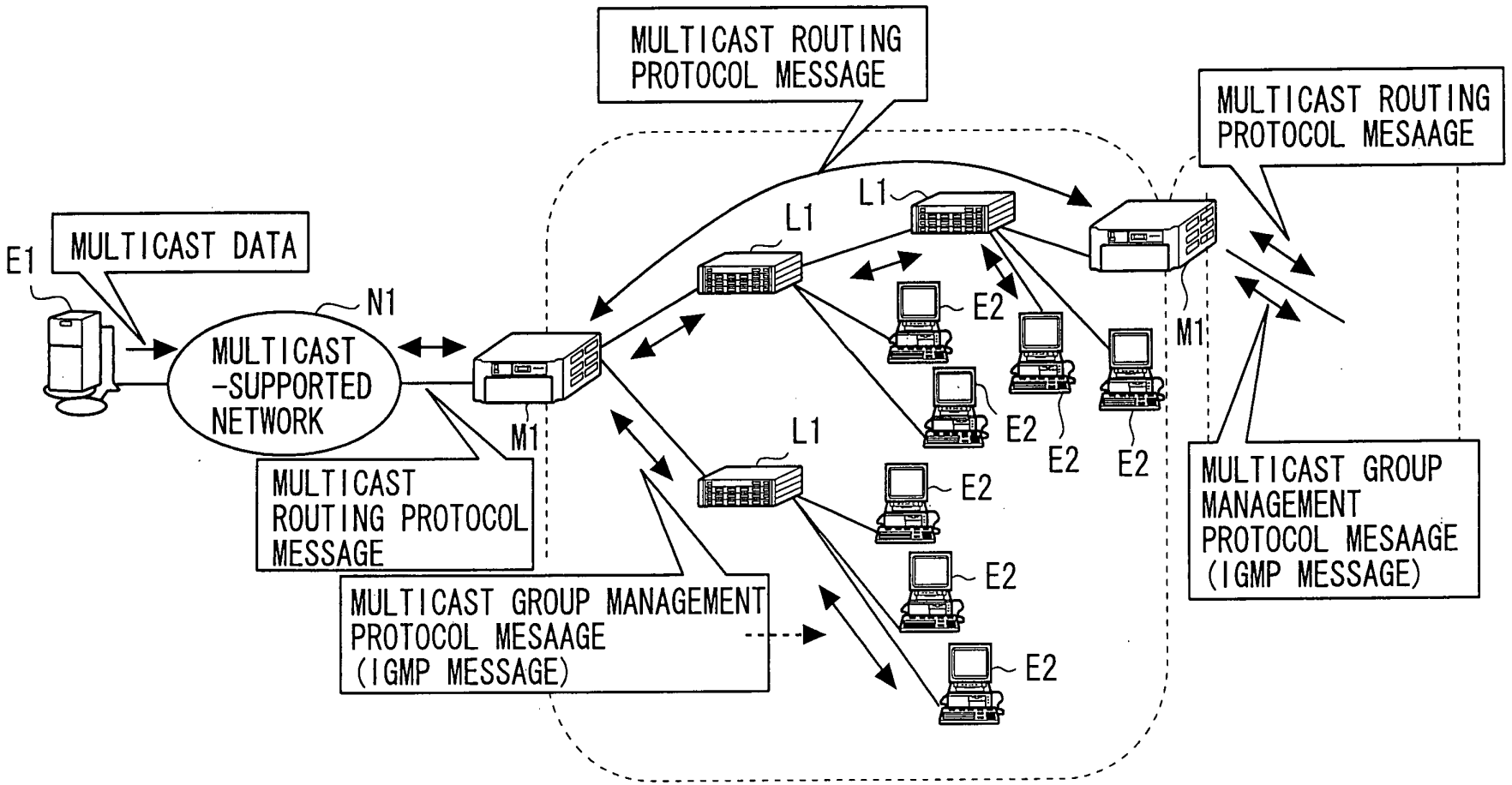
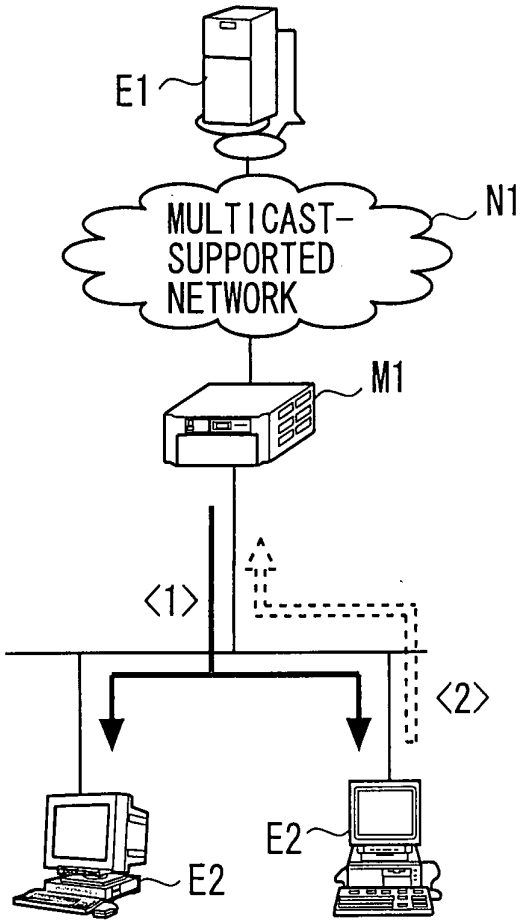

MULTICAST ROUTING PROTOCOL MESSAGE
MULTICAST ROUTING PROTOCOL MESAAGE
E1
MULTICAST DATA
N1
MULTICAST -SUPPORTED NETWORK
L1
L1
L1
E2
E2
E2
E2
E2
M1
M1
MULTICAST ROUTING PROTOCOL MESSAGE
MULTICAST GROUP MANAGEMENT PROTOCOL MESAAGE (IGMP MESSAGE)
MULTICAST GROUP MANAGEMENT PROTOCOL MESAAGE (IGMP MESSAGE)

FIG. 2

PRIOR ART

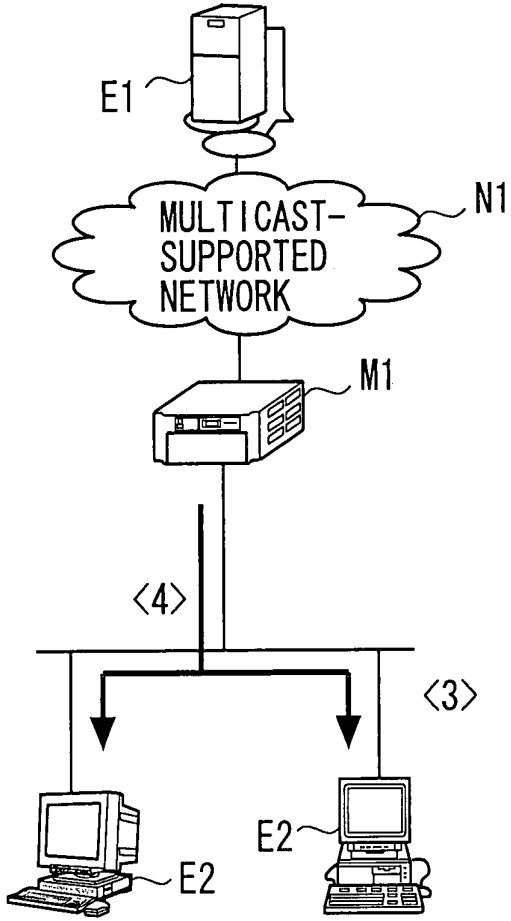
CLASS-D ADDRESS	APPLICATION
224.0.0.0	RESERVED
224.0.0.1～224.0.0.255 224.0.0.1-ALL-SYSTEMS 224.0.0.2-ALL-ROUTERS 224.0.0.4-DVMRP ROUTERS 224.0.0.5-OSFP-ALL ⋮	ASSIGNMENT FOR ROUTING PROTOCOL ETC.
224.0.1.0～238.255.255.255 224.0.1.7-AUDIO NEWS 224.0.1.11-VOICE OF IETF MEETING 224.0.1.12-VIDEO OF IETF MEETING 224.0.1.16-MUSIC SERVICE ⋮	ASSIGNMENT FOR PUBLIC USE
239.0.0.0～239.255.255.255	ASSIGNMENT FOR LOCAL SITE

FIG. 3A PRIOR ART



PARTICIPATION IN IGMPV1
MULTICAST GROUP

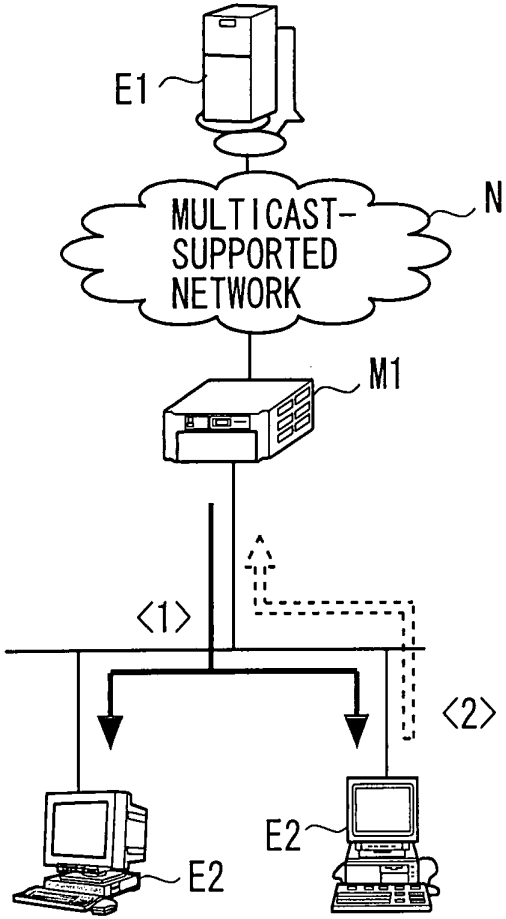
FIG. 3B PRIOR ART



LEAVING FROM IGMPV1
MULTICAST GROUP

FIG. 4A

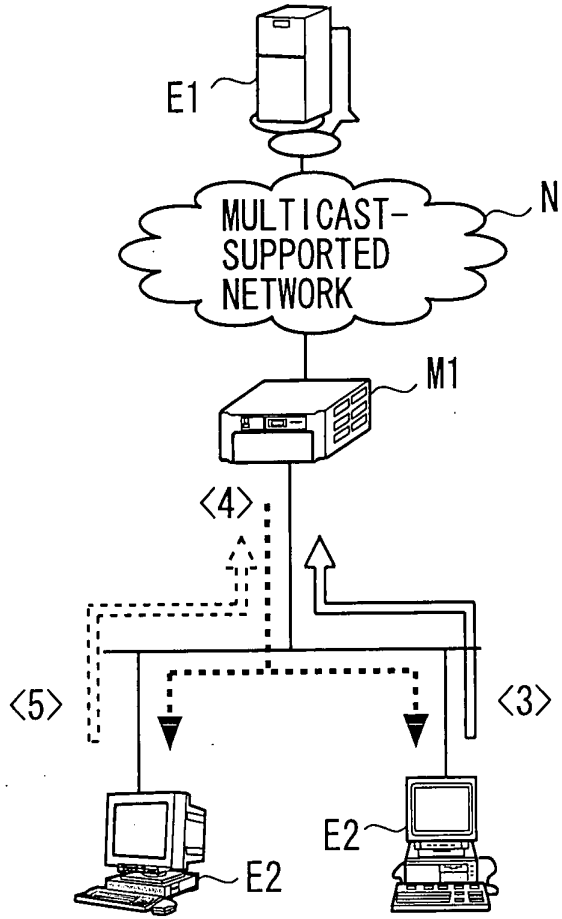
PRIOR ART



PARTICIPATION IN IGMPV2
MULTICAST GROUP

FIG. 4B

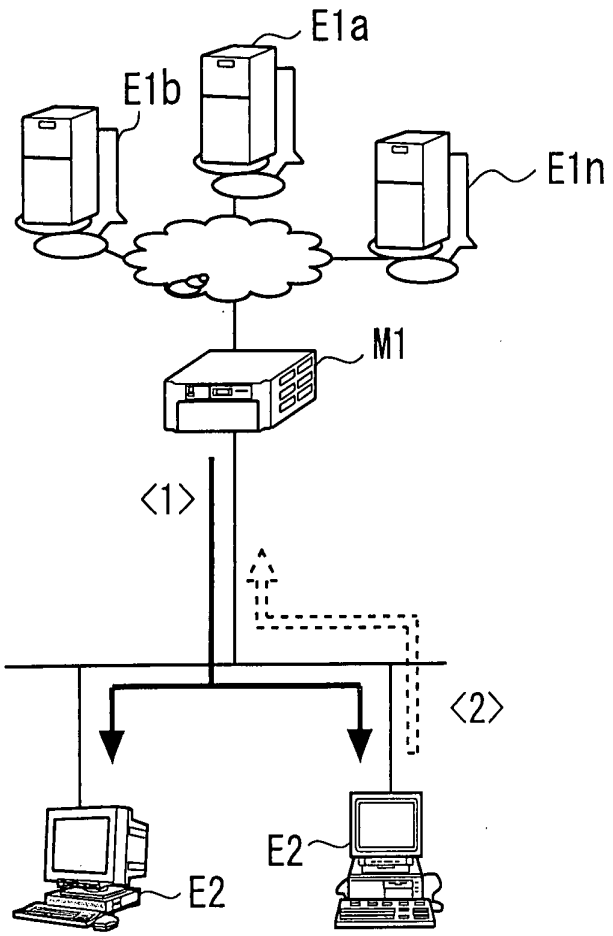
PRIOR ART



LEAVING FROM IGMPV2
MULTICAST GROUP

FIG. 5A

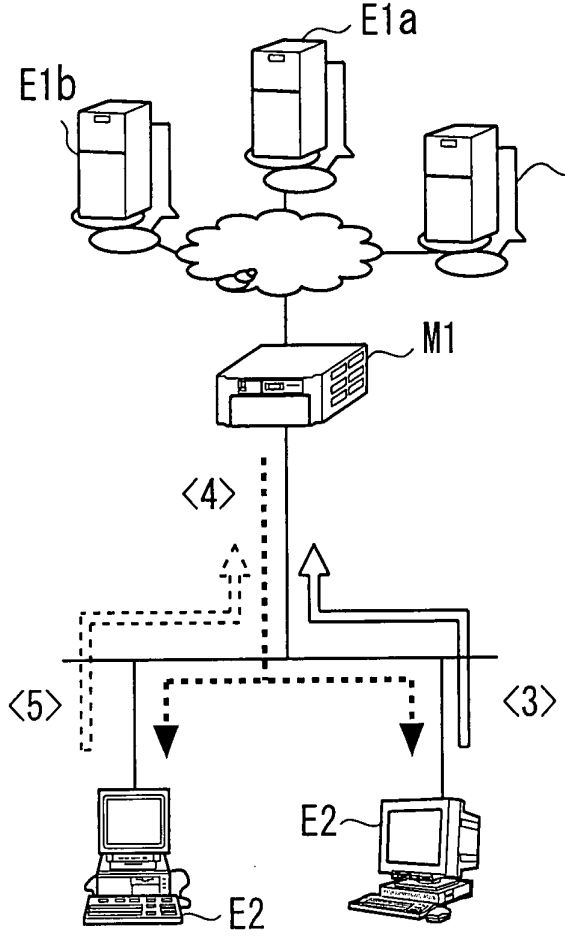
PRIOR ART



PARTICIPATION IN IGMPV3 MULTICAST GROUP

FIG. 5B

PRIOR ART



LEAVING FROM IGMPV3 MULTICAST GROUP

FIG. 6

PRIOR ART

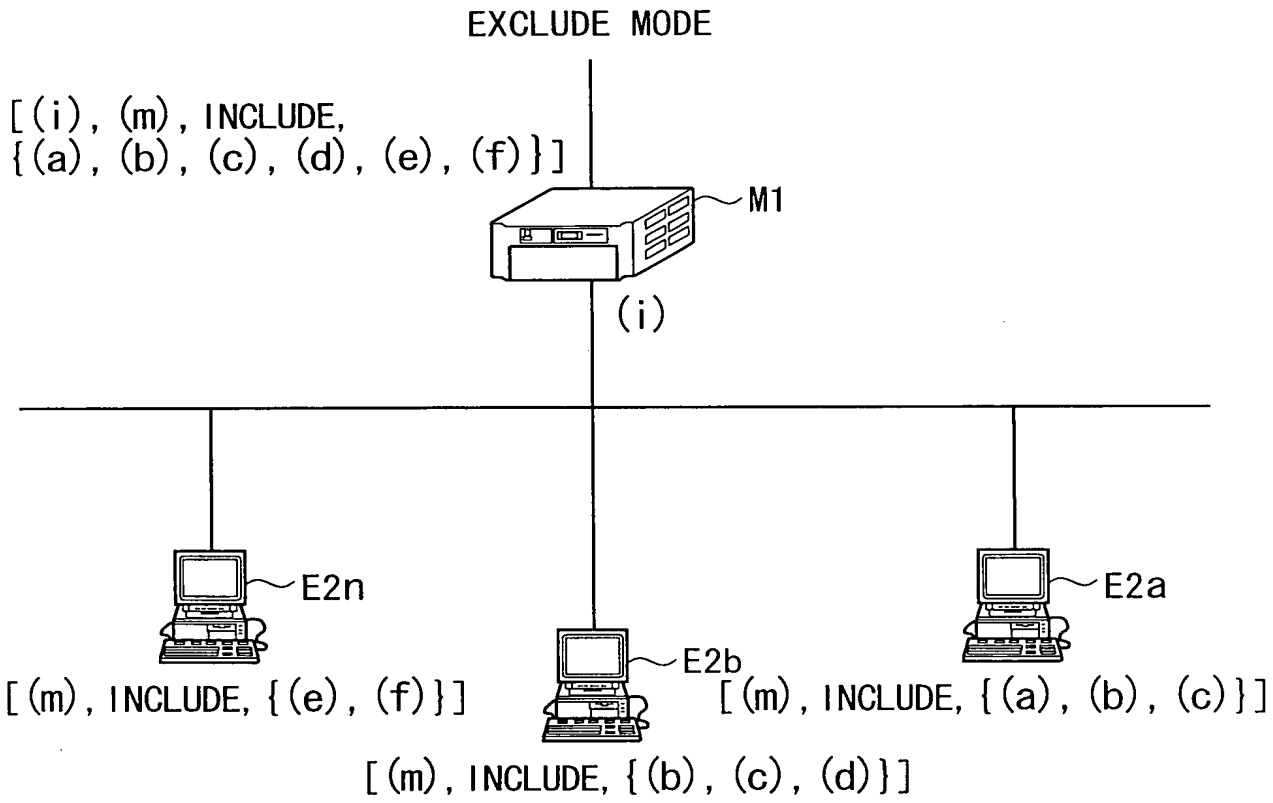


FIG. 7

PRIOR ART

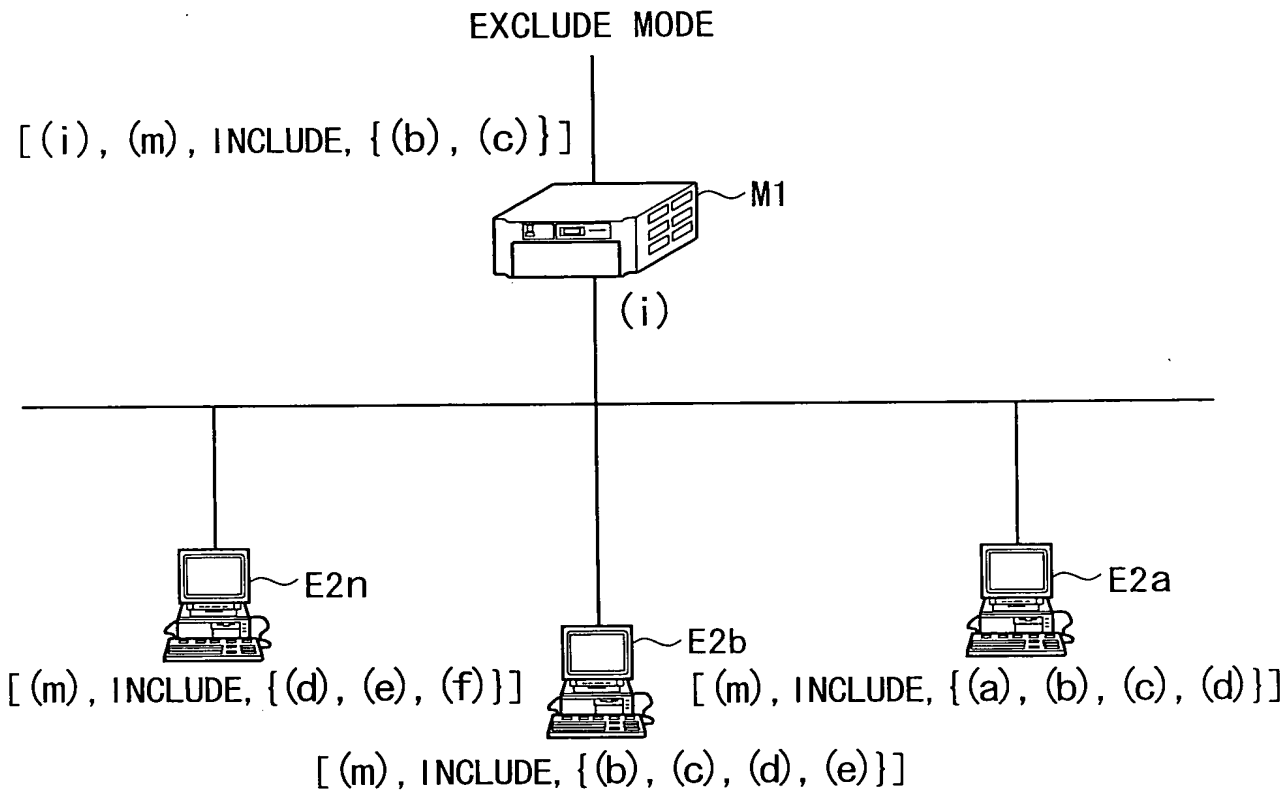


FIG. 8

PRIOR ART

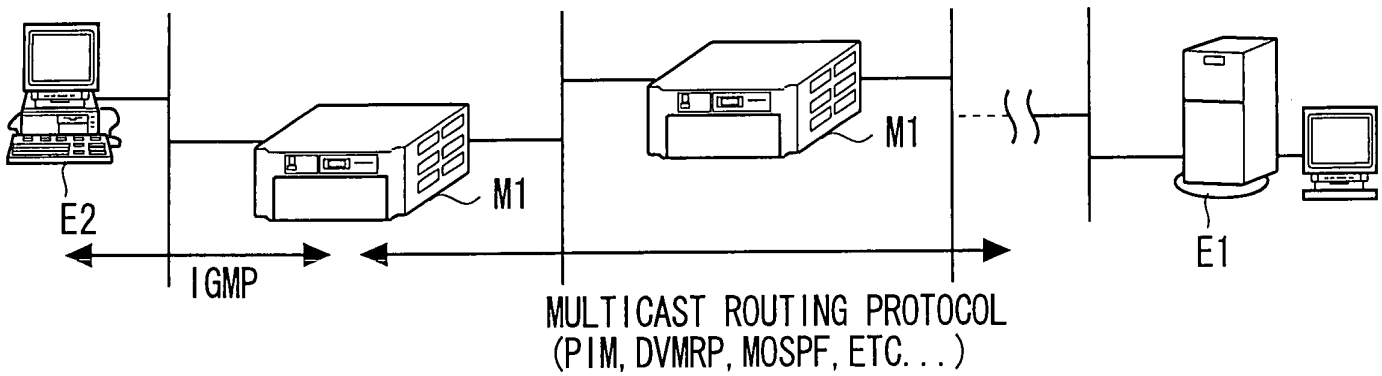


FIG. 9

PRIOR ART

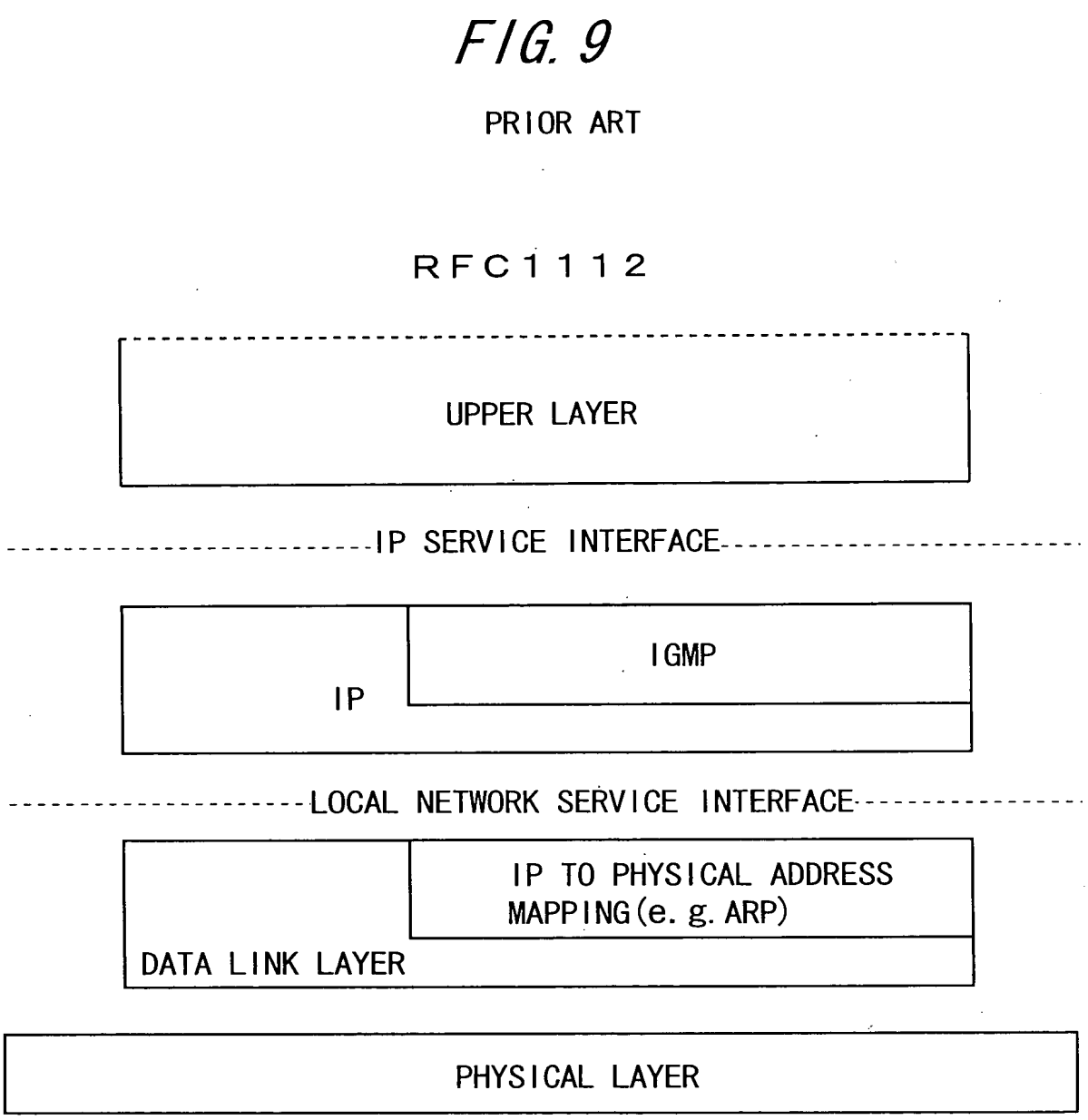


FIG. 10

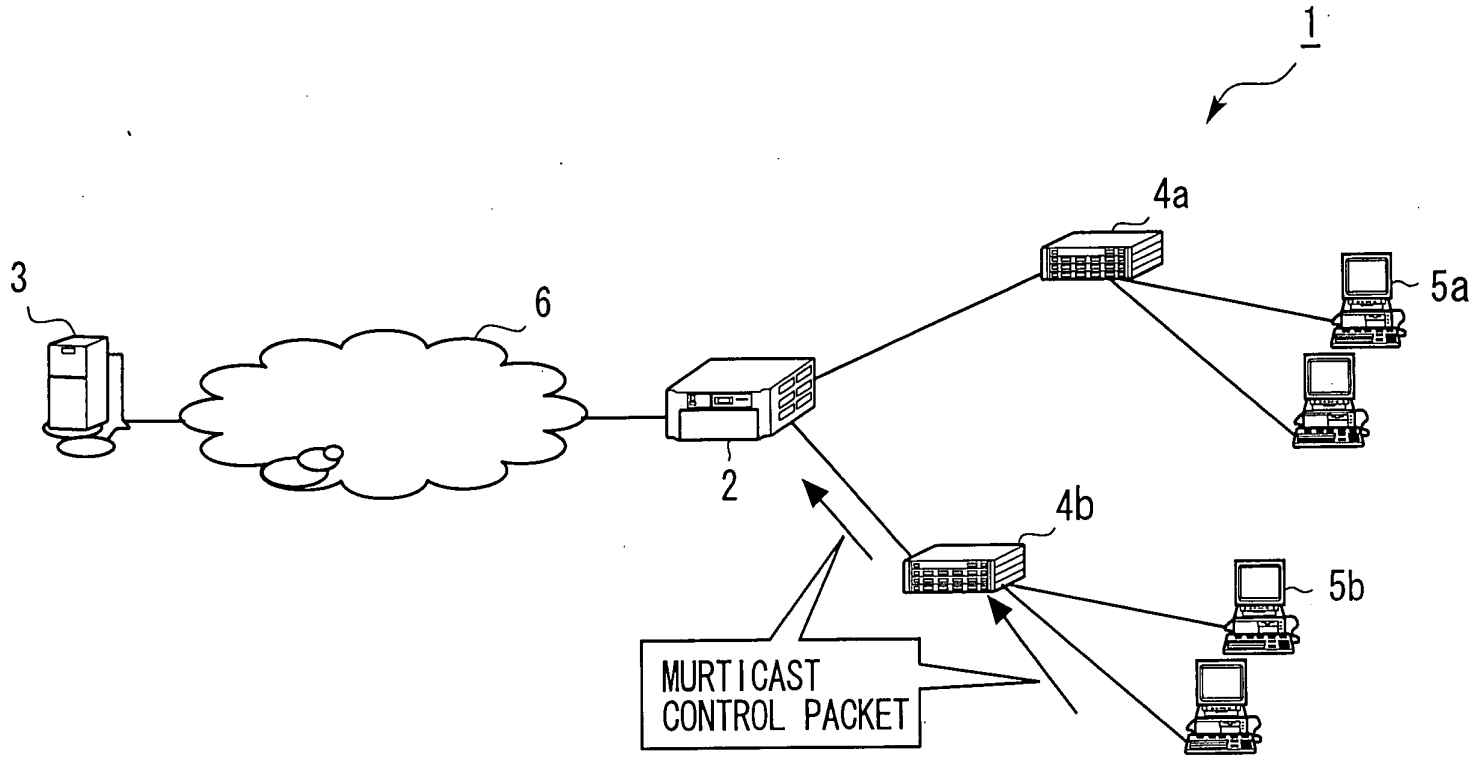


FIG. 11

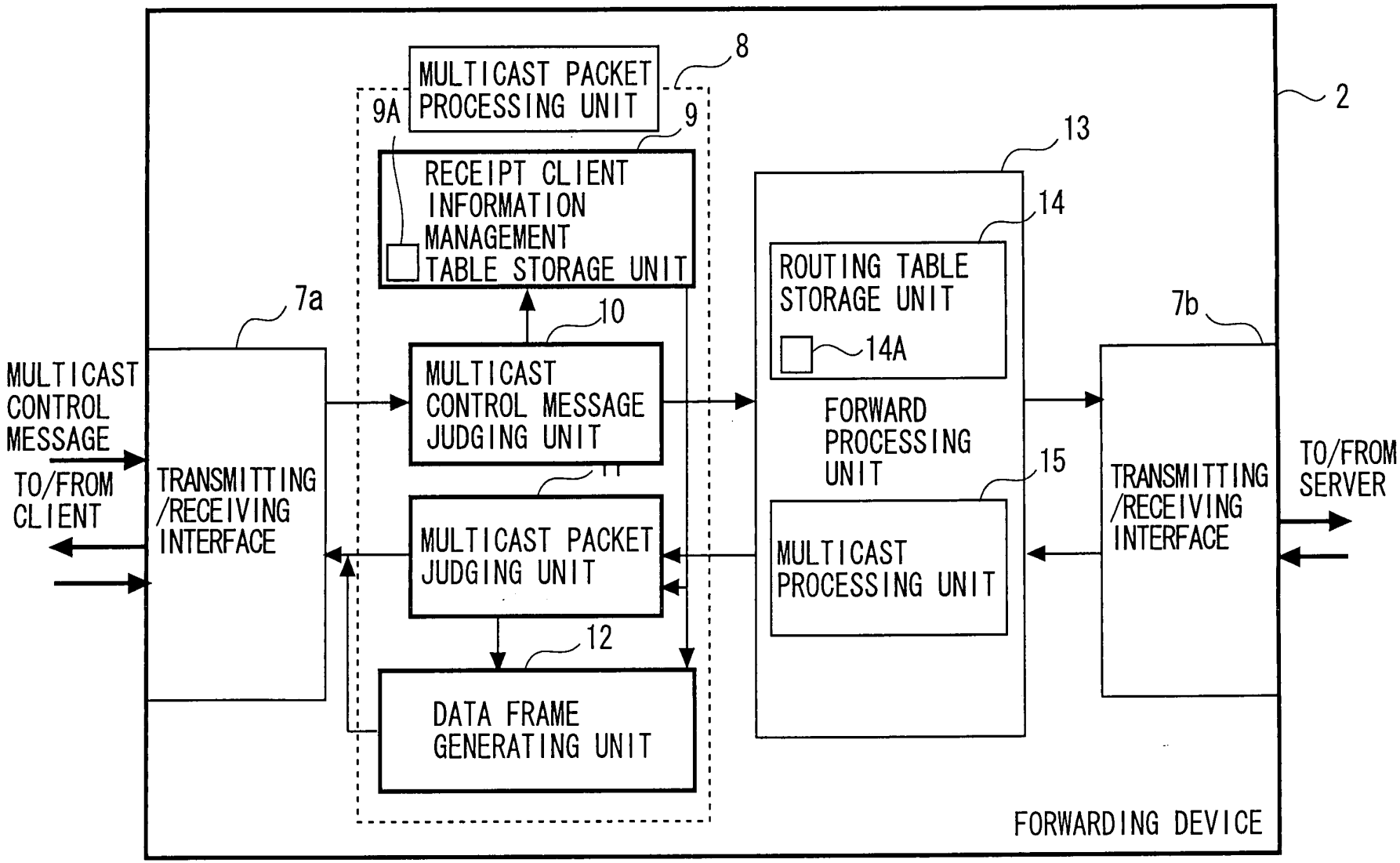

MULTICAST PACKET PROCESSING UNIT
8
9A
9
RECEIPT CLIENT INFORMATION MANAGEMENT TABLE STORAGE UNIT
2
13
14
ROUTING TABLE STORAGE UNIT
14A
7a
10
7b
MULTICAST CONTROL MESSAGE
MULTICAST CONTROL MESSAGE JUDGING UNIT
FORWARD PROCESSING UNIT
TO/FROM CLIENT
TRANSMITTING /RECEIVING INTERFACE
11
15
TRANSMITTING /RECEIVING INTERFACE
TO/FROM SERVER
MULTICAST PACKET JUDGING UNIT
MULTICAST PROCESSING UNIT
12
DATA FRAME GENERATING UNIT
FORWARDING DEVICE

FIG. 12

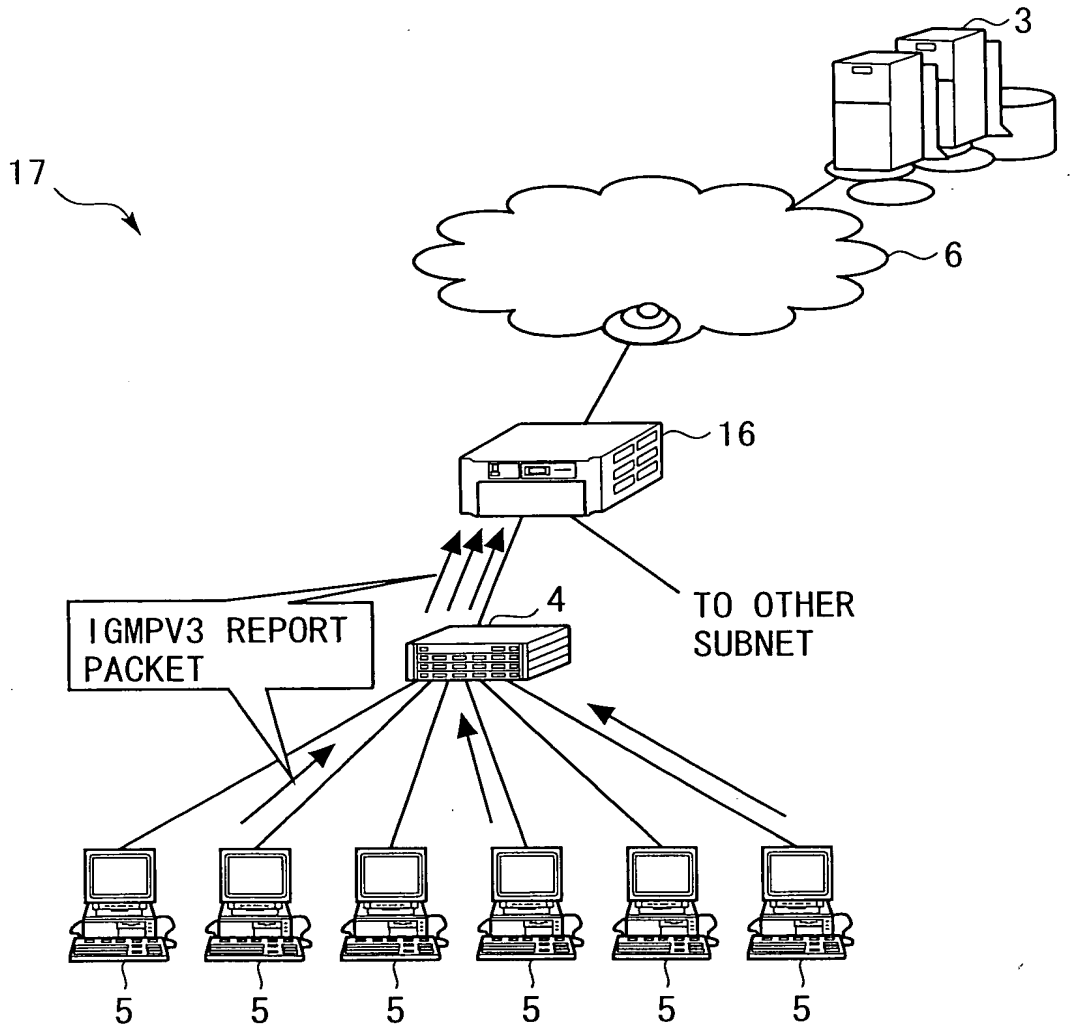


FIG. 13

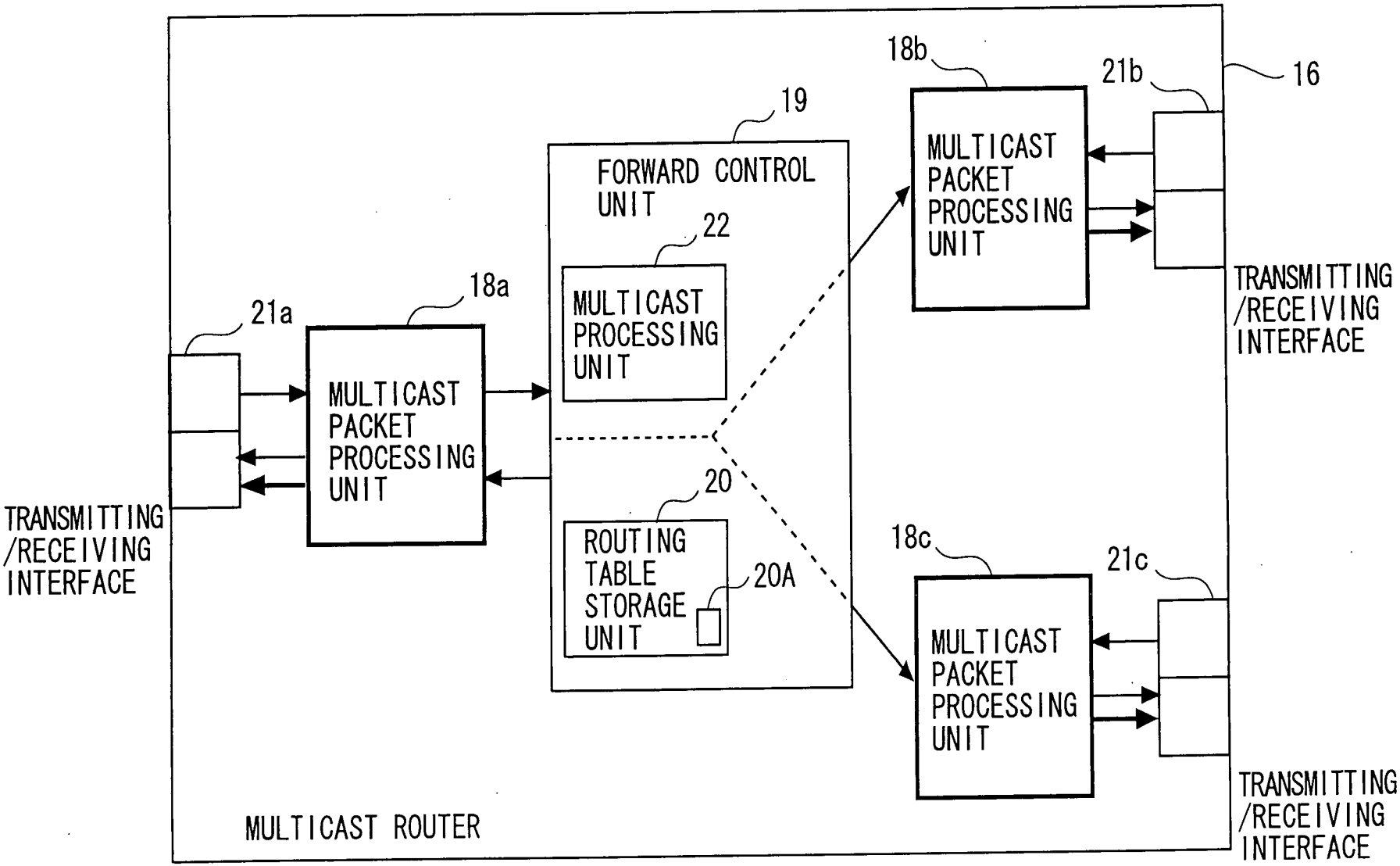

16
18b
21b
19
FORWARD CONTROL UNIT
MULTICAST PACKET PROCESSING UNIT
22
MULTICAST PROCESSING UNIT
18a
21a
MULTICAST PACKET PROCESSING UNIT
TRANSMITTING /RECEIVING INTERFACE
TRANSMITTING /RECEIVING INTERFACE
20
ROUTING TABLE STORAGE UNIT
20A
18c
21c
MULTICAST PACKET PROCESSING UNIT
TRANSMITTING /RECEIVING INTERFACE
MULTICAST ROUTER

FIG. 14

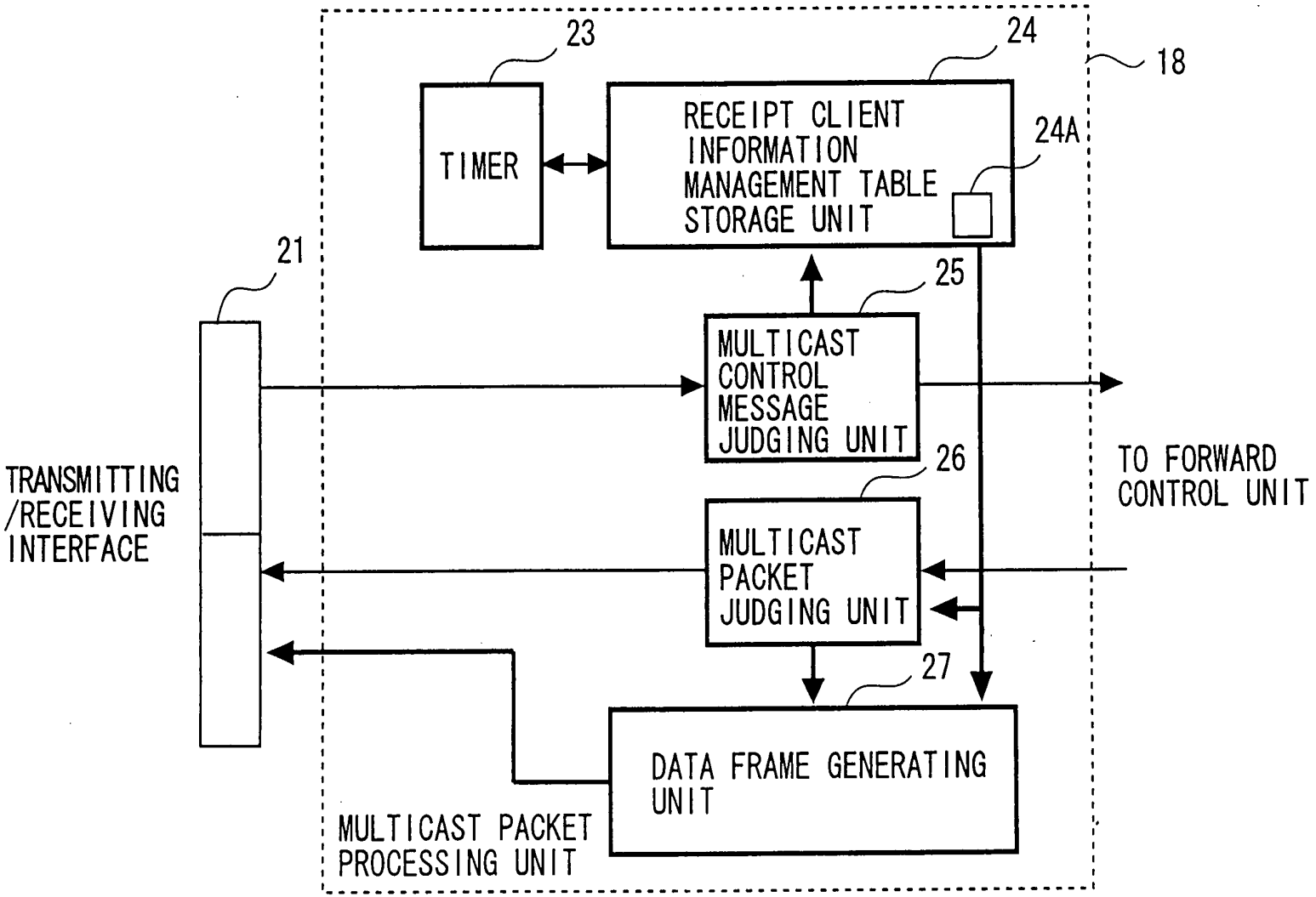

23
24
18
TIMER
RECEIPT CLIENT INFORMATION MANAGEMENT TABLE STORAGE UNIT
24A
21
25
MULTICAST CONTROL MESSAGE JUDGING UNIT
TRANSMITTING /RECEIVING INTERFACE
26
TO FORWARD CONTROL UNIT
MULTICAST PACKET JUDGING UNIT
27
DATA FRAME GENERATING UNIT
MULTICAST PACKET PROCESSING UNIT

FIG. 15

24A

ENTRY NUMBER	CLIENT ADDRESS	CLIENT MAC ADDRESS	MULTICAST ADDRESS	SOURCE ADDRESS	FILTER MODE
1	210.23.171.aa	xx:xx:xx:xx:12:34	238.0.0.123	61.143.221.2	INCLUDE
				61.143.221.3	
				61.143.221.4	
			238.28.0.33	201.67.113.65	INCLUDE
2	210.23.171.bb	xx:xx:xx:xx:56:78	238.225.13.33	211.67.0.3	EXCLUDE
				211.67.0.5	
3	210.23.171.cc	xx:xx:xx:xx:90:12	239.128.0.23	174.67.119.68	INCLUDE
4	210.23.171.dd	xx:xx:xx:xx:34:56	238.0.0.123	61.143.221.2	EXCLUDE
				61.143.221.5	
				61.143.221.6	
			239.12.67.192	198.12.57.227	EXCLUDE
				198.12.57.238	
5	210.23.171.ee	xx:xx:xx:xx:78:90	238.125.65.1	172.0.12.5	EXCLUDE
6	210.23.171.ff	xx:xx:xx:xx:01:23	239.128.0.123	61.143.221.2	INCLUDE
				61.143.221.3	
				61.143.221.5	

FIG. 16

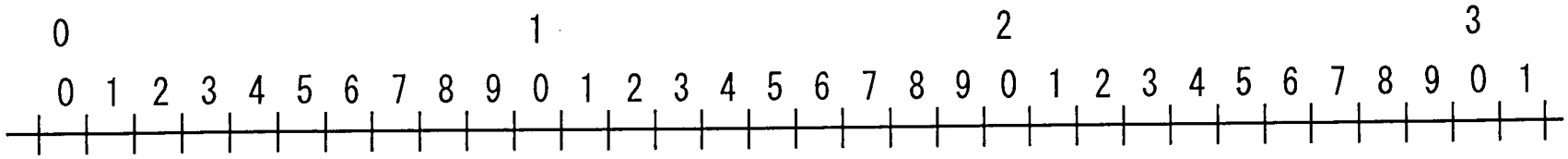
IGMP MESSAGE FORMAT

FIG. 17

MLDV2 MESSAGE FORMAT

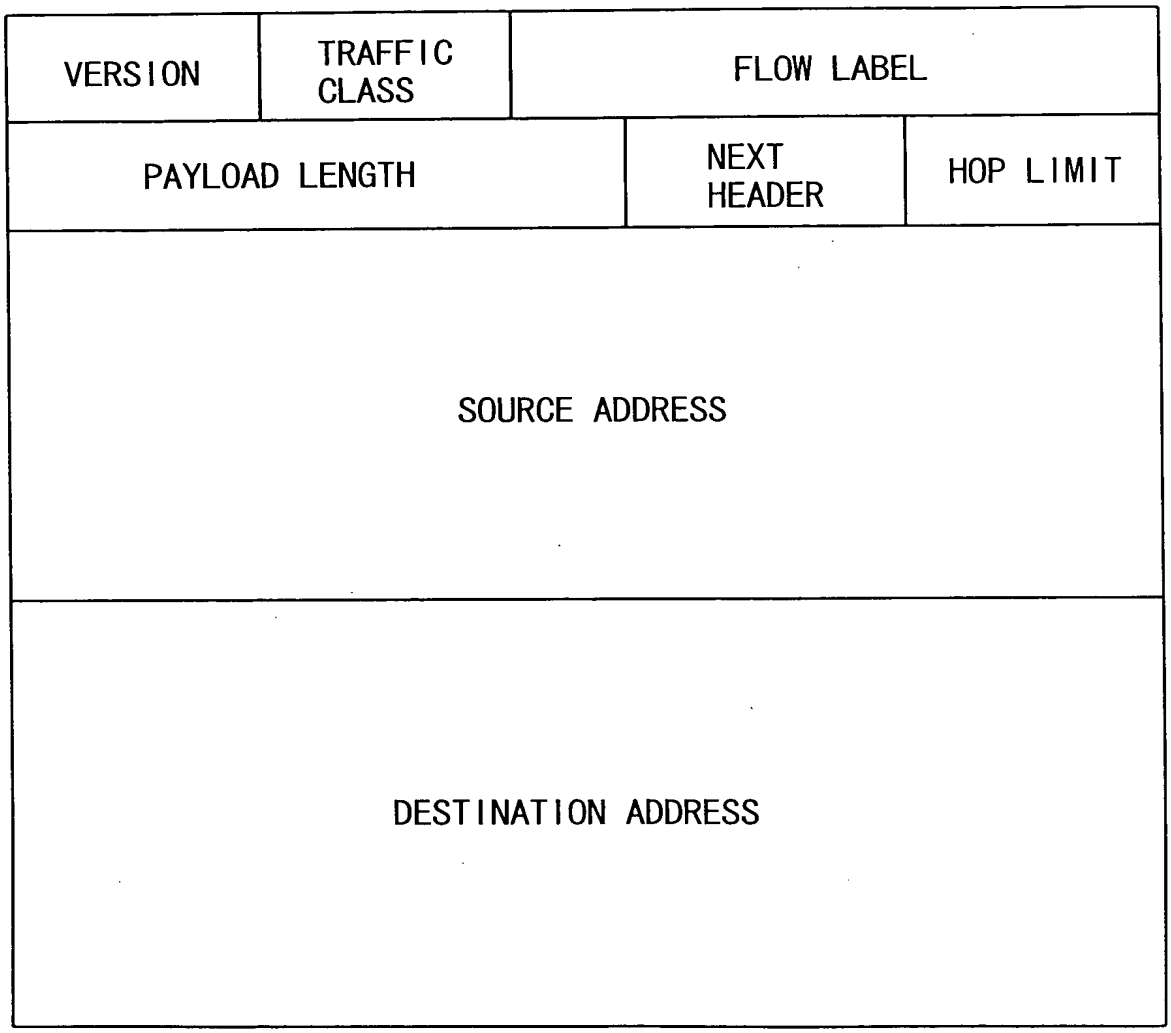
FIG. 18

IPV4 HEADER FORMAT(RFC791)



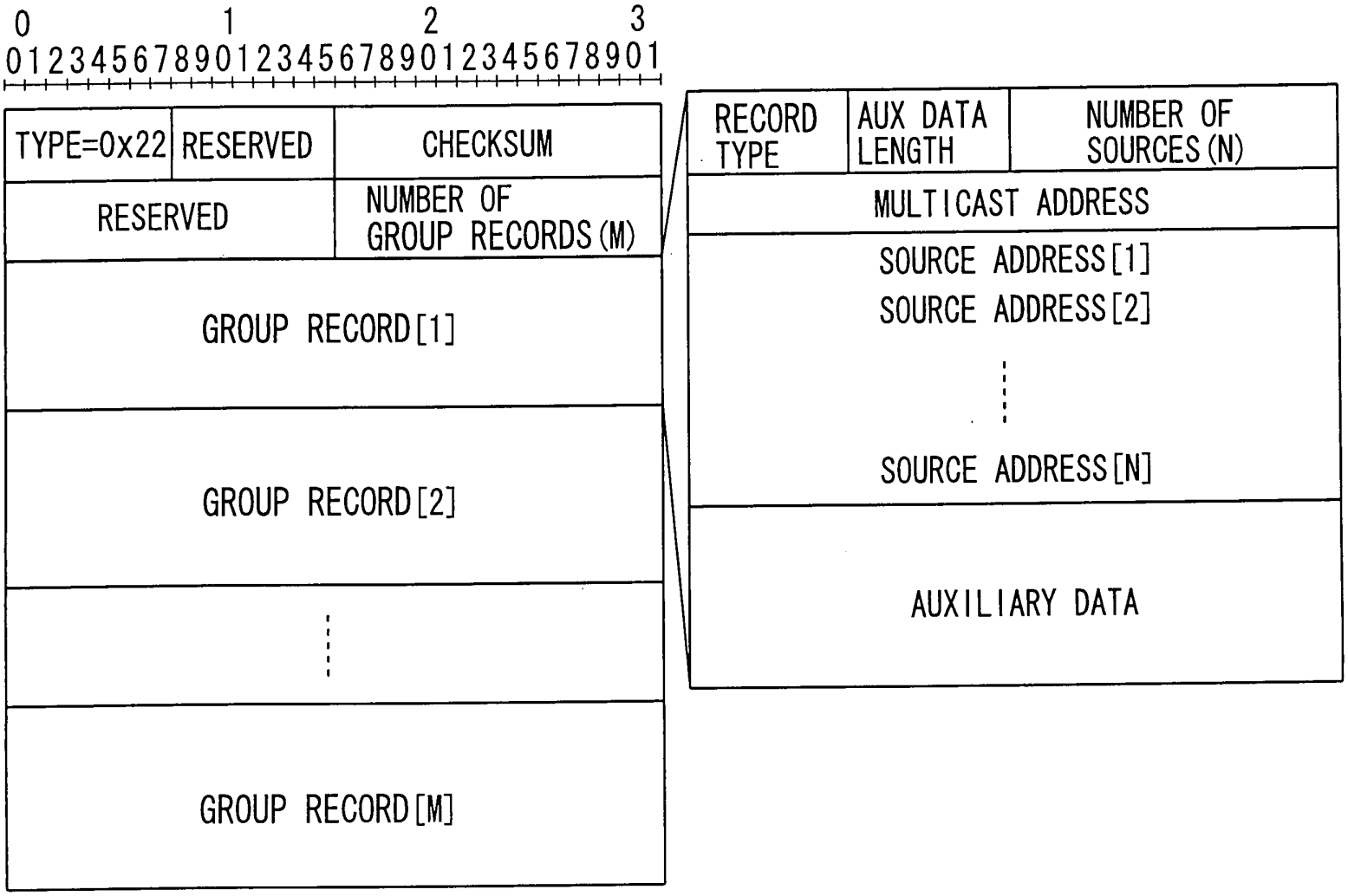
VERSION	IHL	TYPE OF SERVICE	TOTAL LENGTH
IDENTIFICATION		FLAGS	FRAGMENT OFFSET
TIME TO LIVE	PROTOCOL ID(=2)	HEADER CHECKSUM	
SOURCE ADDRESS			
DESTINATION ADDRESS			
OPTIONS			PADDING

FIG. 19



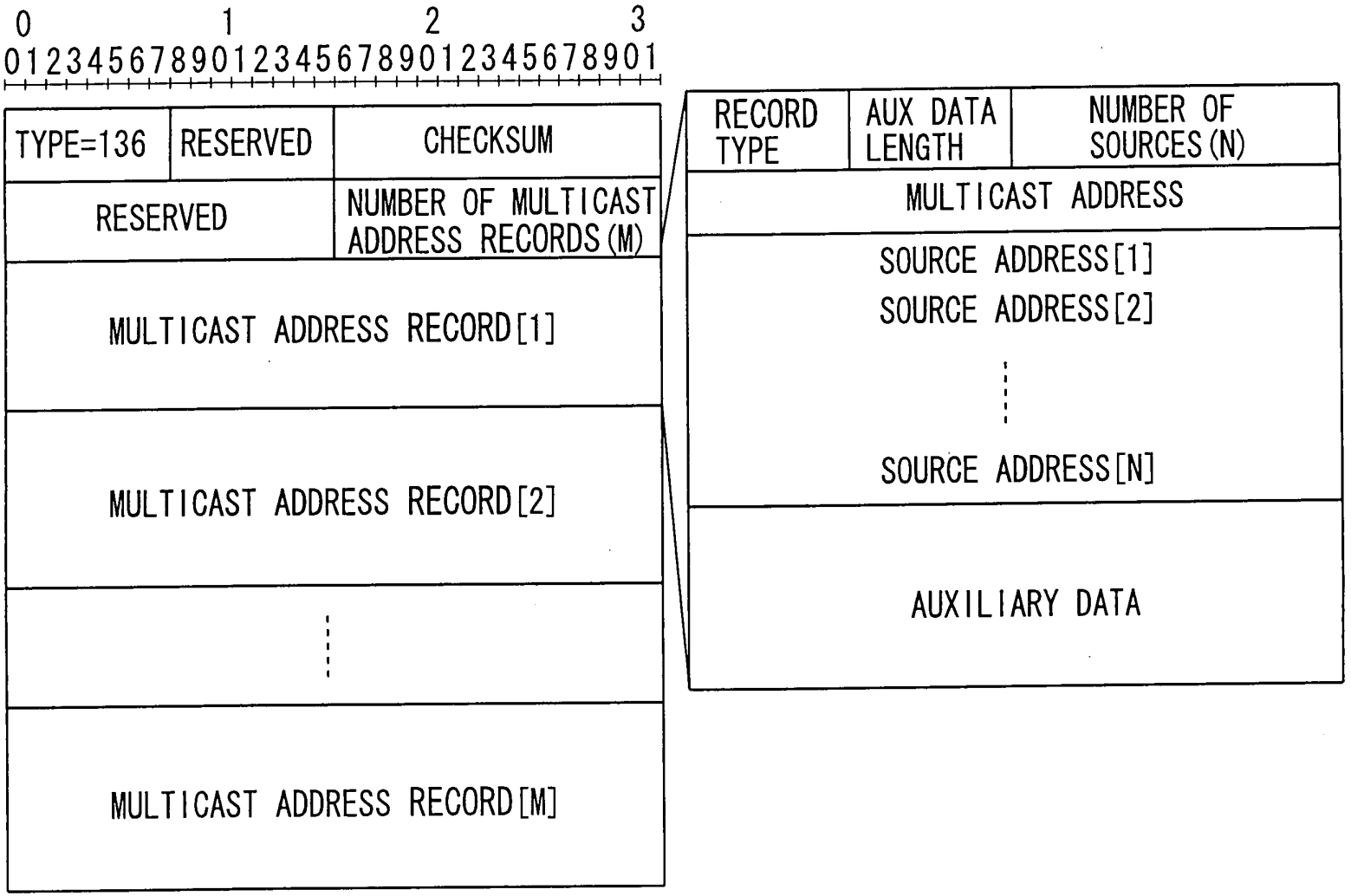
IPV6 HEADER FORMAT (RFC2460)

FIG. 20



IGMPV3 REPORT MESSAGE FORMAT

FIG. 21



MLDV2 REPORT MESSAGE FORMAT

FIG. 22

24A

ENTRY NUMBER	CLIENT ADDRESS	CLIENT MAC ADDRESS	MULTICAST ADDRESS	SOURCE ADDRESS	FILTER MODE
•	•	•	•	•	•
•	•	•	•	•	•
•	•	•	•	•	•
7	210.23.171.gg	xx:xx:xx:xx:45:67	238.0.2.222	61.143.221.38	INCLUDE

FIG. 23

24A

ENTRY NUMBER	CLIENT ADDRESS	CLIENT MAC ADDRESS	MULTICAST ADDRESS	SOURCE ADDRESS	FILTER MODE
1	210.23.171.aa	xx:xx:xx:xx:12:34	238.0.0.123	61.143.221.2	EXCLUDE
			238.28.0.33	201.67.113.65	INCLUDE
•	•	•	•	•	•
•	•	•	•	•	•
•	•	•	•	•	•

FIG. 24

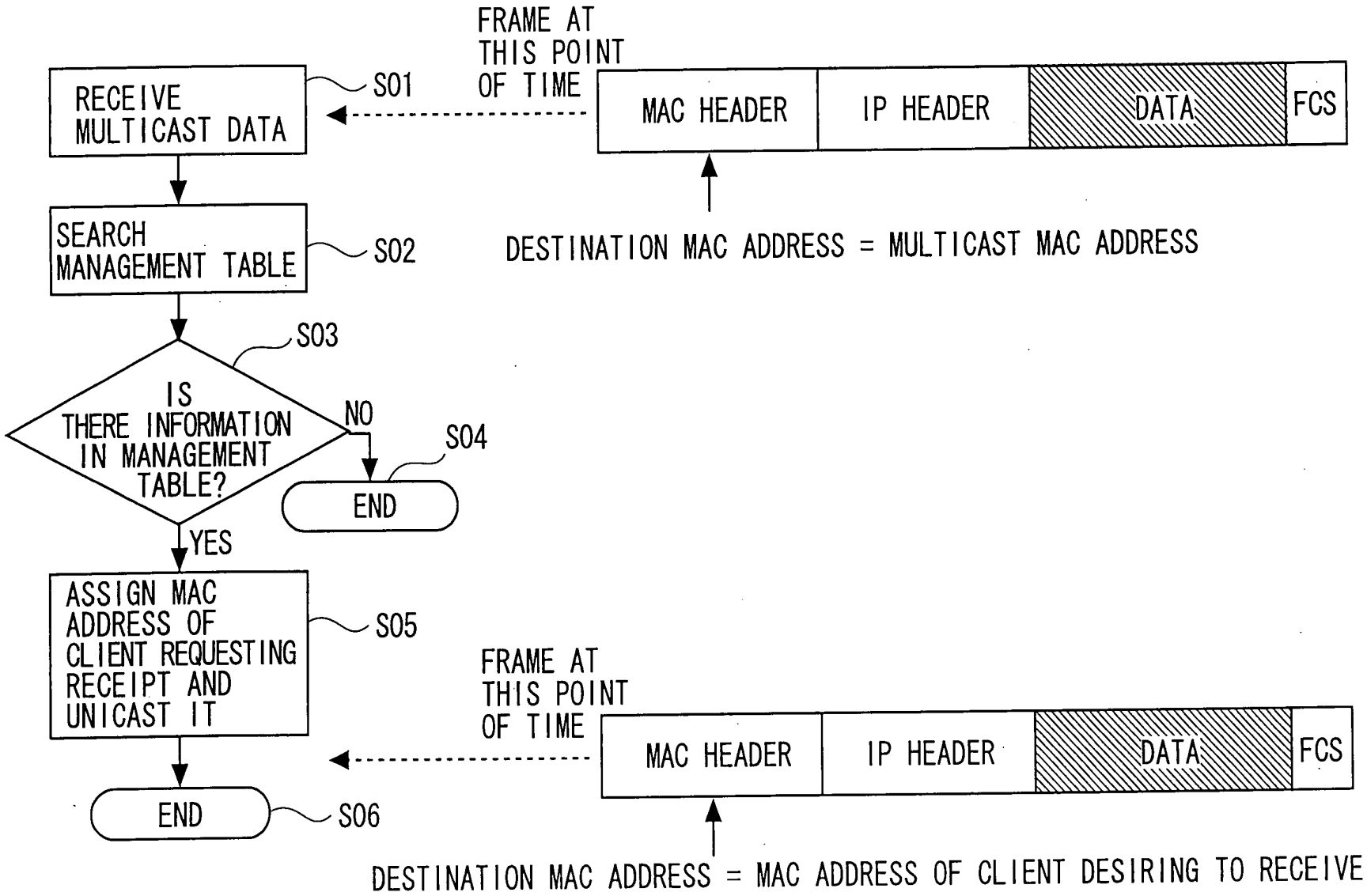

RECEIVE MULTICAST DATA
S01
SEARCH MANAGEMENT TABLE
S02
S03
IS THERE INFORMATION IN MANAGEMENT TABLE?
NO
S04
END
YES
ASSIGN MAC ADDRESS OF CLIENT REQUESTING RECEIPT AND UNICAST IT
S05
END
S06
FRAME AT THIS POINT OF TIME
MAC HEADER
IP HEADER
DATA
FCS
DESTINATION MAC ADDRESS = MULTICAST MAC ADDRESS
FRAME AT THIS POINT OF TIME
MAC HEADER
IP HEADER
DATA
FCS
DESTINATION MAC ADDRESS = MAC ADDRESS OF CLIENT DESIRING TO RECEIVE

FIG. 25

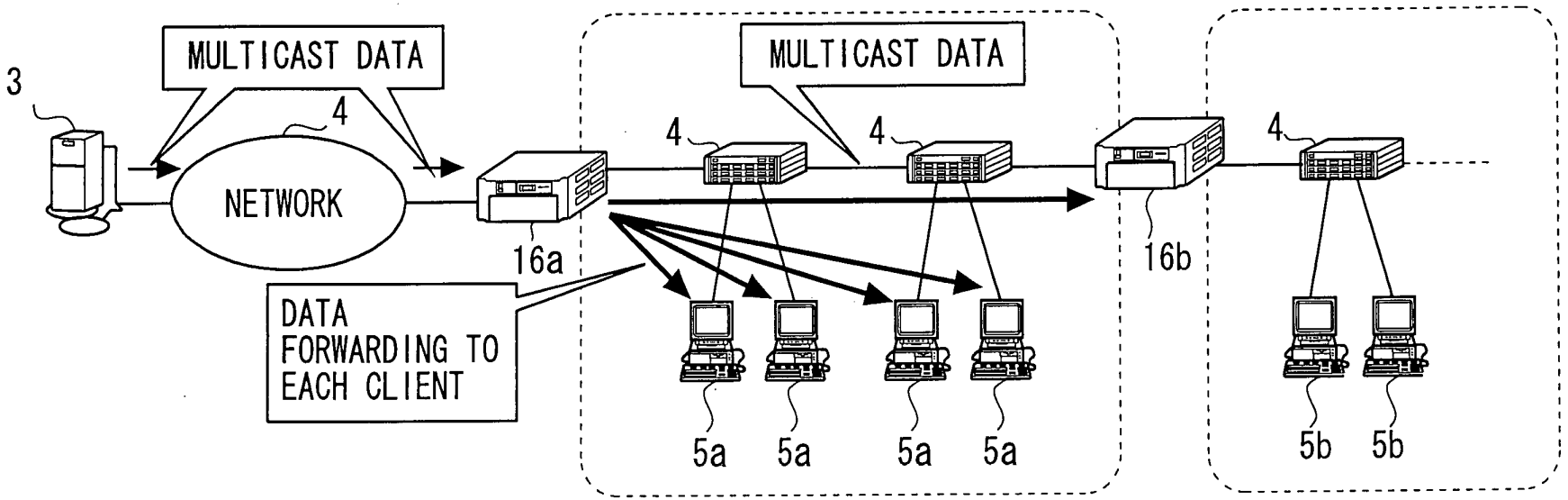

3
MULTICAST DATA
4
NETWORK
16a
DATA
FORWARDING TO
EACH CLIENT
MULTICAST DATA
4
4
4
16b
5a
5a
5a
5a
5b
5b

FIG. 26

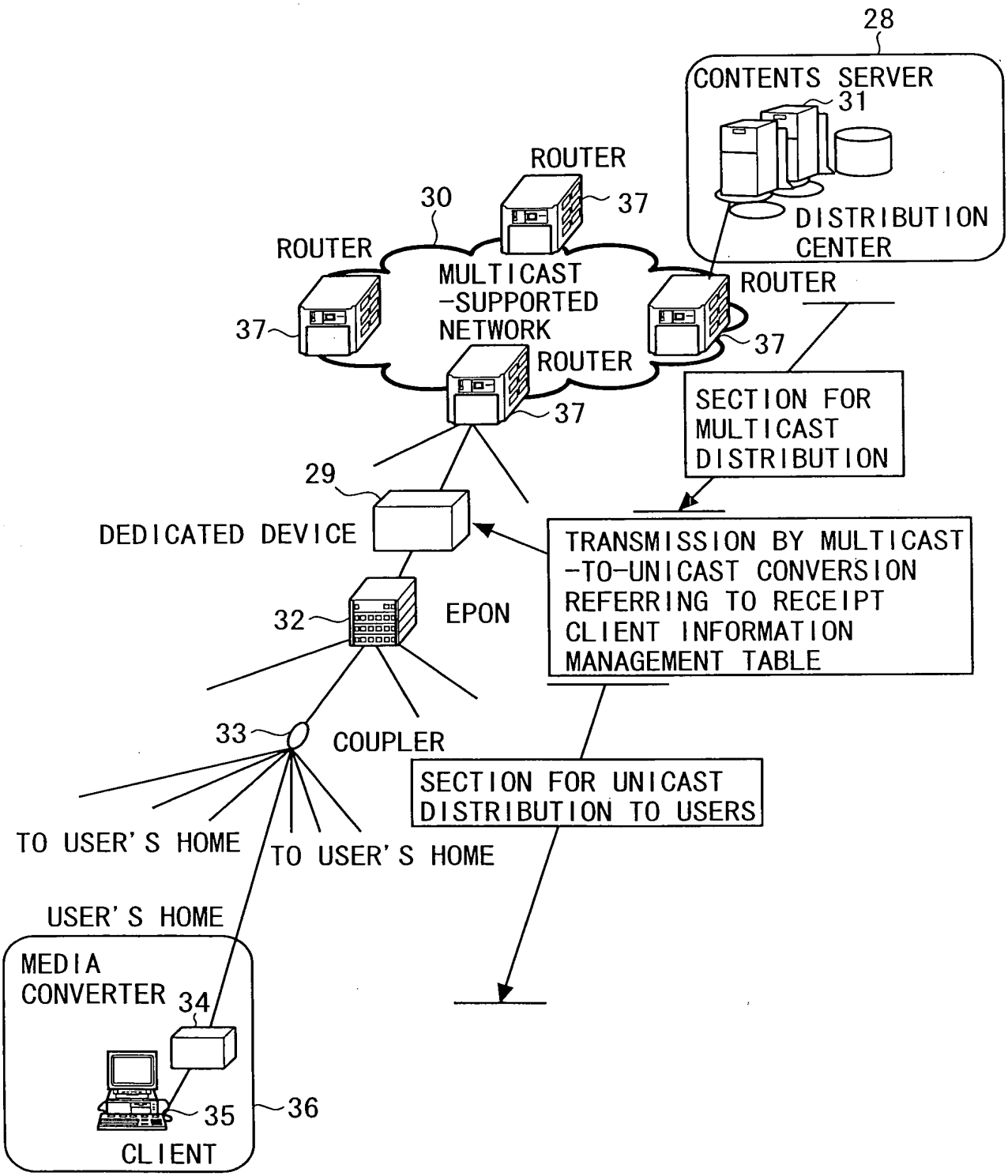

28
CONTENTS SERVER
31
DISTRIBUTION CENTER
ROUTER
37
30
ROUTER
MULTICAST -SUPPORTED NETWORK
ROUTER
37
37
ROUTER
37
SECTION FOR MULTICAST DISTRIBUTION
29
DEDICATED DEVICE
TRANSMISSION BY MULTICAST -TO-UNICAST CONVERSION REFERRING TO RECEIPT CLIENT INFORMATION MANAGEMENT TABLE
32
EPON
33
COUPLER
SECTION FOR UNICAST DISTRIBUTION TO USERS
TO USER'S HOME
TO USER'S HOME
USER'S HOME
MEDIA CONVERTER
34
35
36
CLIENT

FIG. 27

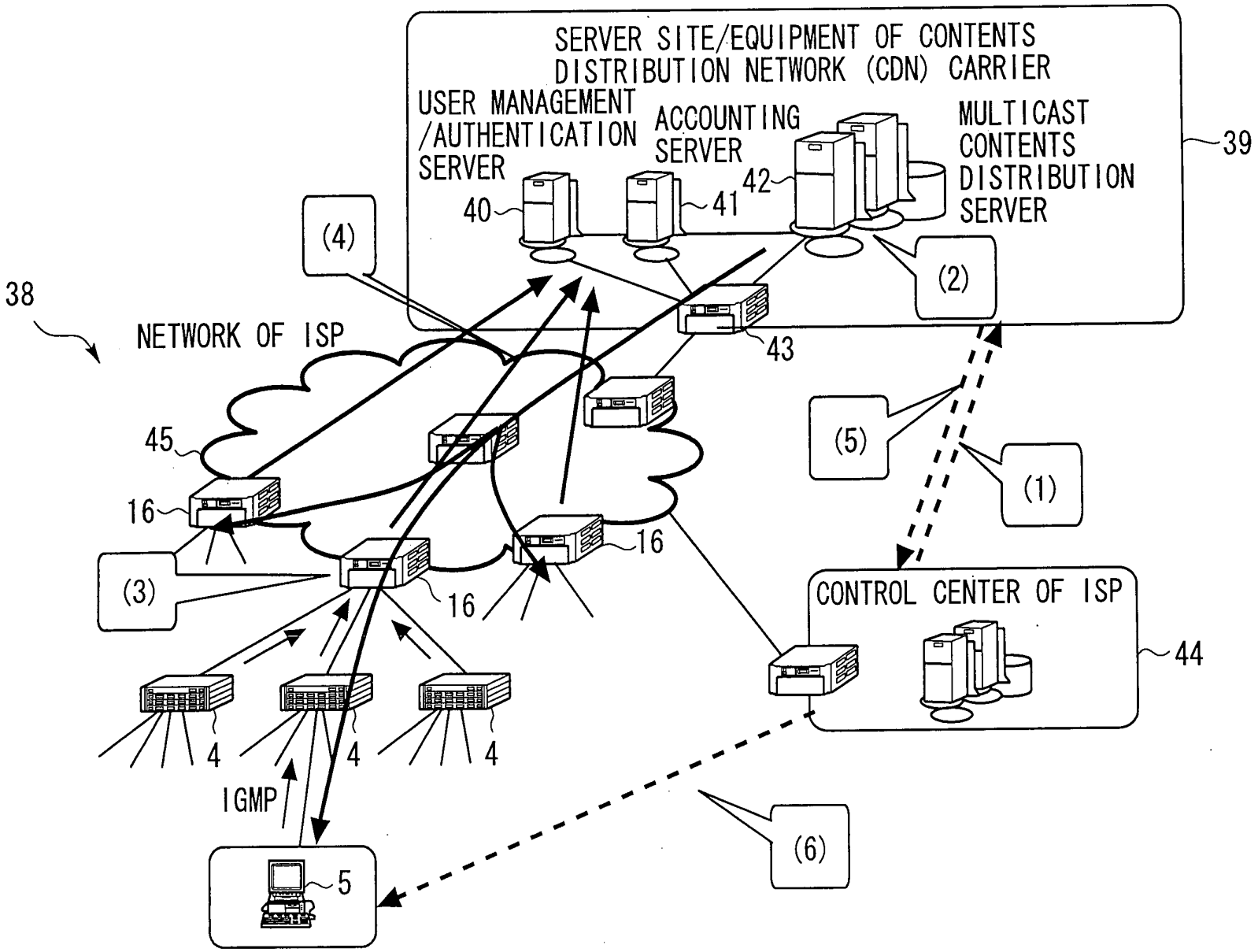
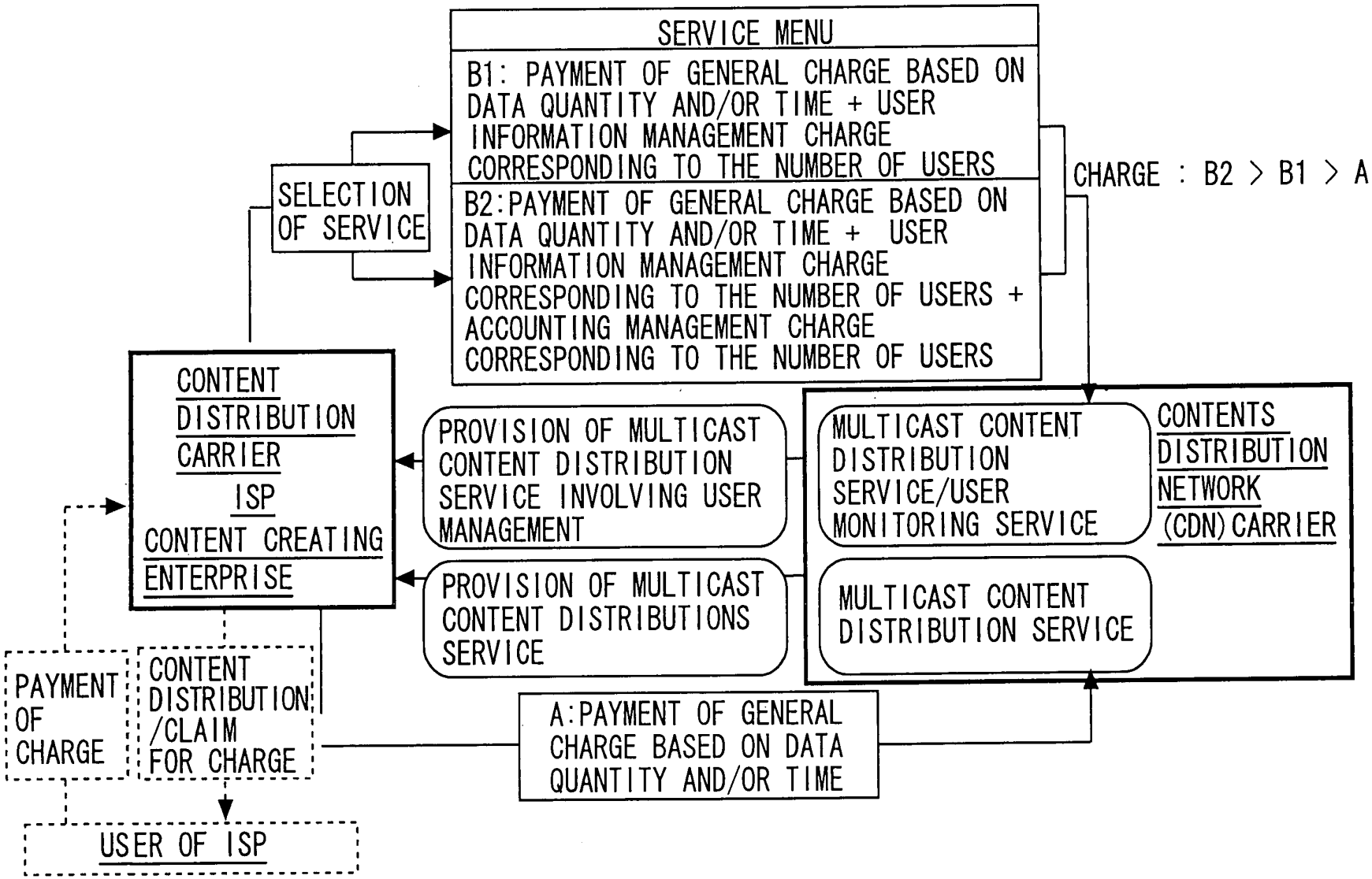

SERVER SITE/EQUIPMENT OF CONTENTS DISTRIBUTION NETWORK (CDN) CARRIER
USER MANAGEMENT /AUTHENTICATION SERVER
ACCOUNTING SERVER
MULTICAST CONTENTS DISTRIBUTION SERVER
39
40
41
42
43
(4)
(2)
38
NETWORK OF ISP
45
16
16
16
(5)
(1)
(3)
CONTROL CENTER OF ISP
44
4
4
4
IGMP
5
(6)

FIG. 28

USER MANAGEMENT TABLE 46

USER NAME	USER ADDRESS (CLIENT ADDRESS)	RECEIPT CONTENT ADDRESS (MULTICAST ADDRESS)	RECEPTION STARTING TIME	RECEPTION ENDING TIME
A	xxx. xx. x. 111	238. 0. a. aaa	T11	T12
		238. 0. a. bbb	T13	T14
B	xxx. xx. x. 112	238. 0. a. bbb	T21	T22
C	xxx. xx. x. 113	238. 0. a. aaa	T31	T32
		238. 0. a. bbb	T33	T34
		238. 0. a. ccc	T35	T36
• • •	• • •	• • •	• • •	• • •
• • •	• • •	• • •	• • •	• • •
Y	xxx. xx. x. 124	238. 0. a. aaa	T241	T242
Z	xxx. xx. x. 125	238. 0. a. bbb	T251	T252

FIG. 29


SERVICE MENU
B1: PAYMENT OF GENERAL CHARGE BASED ON DATA QUANTITY AND/OR TIME + USER INFORMATION MANAGEMENT CHARGE CORRESPONDING TO THE NUMBER OF USERS
B2:PAYMENT OF GENERAL CHARGE BASED ON DATA QUANTITY AND/OR TIME + USER INFORMATION MANAGEMENT CHARGE CORRESPONDING TO THE NUMBER OF USERS + ACCOUNTING MANAGEMENT CHARGE CORRESPONDING TO THE NUMBER OF USERS
SELECTION OF SERVICE
CHARGE : B2 > B1 > A
CONTENT DISTRIBUTION CARRIER
ISP
CONTENT CREATING ENTERPRISE
PROVISION OF MULTICAST CONTENT DISTRIBUTION SERVICE INVOLVING USER MANAGEMENT
PROVISION OF MULTICAST CONTENT DISTRIBUTIONS SERVICE
MULTICAST CONTENT DISTRIBUTION SERVICE/USER MONITORING SERVICE
MULTICAST CONTENT DISTRIBUTION SERVICE
CONTENTS DISTRIBUTION NETWORK (CDN) CARRIER
PAYMENT OF CHARGE
CONTENT DISTRIBUTION /CLAIM FOR CHARGE
A:PAYMENT OF GENERAL CHARGE BASED ON DATA QUANTITY AND/OR TIME
USER OF ISP